RDF25 Series

XP Power

25W BASEPLATE COOLED

DC-DC CONVERTER

The RDF25 Series delivers 25W and offers single output voltages ranging from 5V to 24V. With an ultra-wide 10:1 input range of 16 to 160VDC, which covers standard industrial voltages and meets all requirements of the EN50155 transportation standard.

With world-wide industrial safety approvals and compliance to transportation standards, high efficiency, high reliability, 3kVAC isolation, remote on/off and wide output trimming, the RDF25 series benefits system designers with easy integration into a wide range of applications including; renewable energy, battery systems, autonomous equipment, factory automation and harsh railway applications.

Features

- Single voltage outputs from 5V to 24VDC
- Wide output voltage trim and remote sense
- 10:1 ultra-wide input range 16 to 160VDC
- Industry standard half brick format
- High efficiency, up to 85%
- 3kVAC reinforced input to output isolation
- ITE safety approvals and EN50155 compliance
- Remote On/Off with low 15mA stand-by current
- -40°C to +100°C operating temperature
- Overvoltage, overload, and short circuit protection
- 3 year warranty

Applications

Autonomous Equipment

Industrial Electronics & Robotics

Railway

Dimensions

50.8 x 25.4 x 11.5mm (2.0" x 1.0" x 0.45")

Models & Ratings

Model Number	Input Voltage	Output Voltage	Output Current	Input Current		Maximum Capacitive Load	Efficiency[2]
				No Load	Full Load		
RDF2572S05	16-160VDC	5V	5000mA	10mA	413.36mA	6800µF	85%
RDF2572S12		12V	2080mA		412.70mA	1000µF	84%
RDF2572S15		15V	1670mA		409.31mA	820µF	85%
RDF2572S24		24V	1040mA		407.84mA	470µF	85%

Notes:

1. Input current measured at nominal input voltage.
2. For heatsink add suffix '-HK', e.g. RDF2572S15-HK

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Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	16		160	VDC	24V, 37.5V, 48V, 72V, 96V & 110V nominal inputs
Input Surge			176	VDC	For 100ms
Undervoltage Lockout		On: 13.8V		VDC	On
		Off: 12V			Off
Standby Mode		3		mA	When module inhibited
Input Filter	Pi type				

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	5		24	VDC	See Models & Ratings
Output Trim			±10	%	
Initial Set Accuracy			±1.0	%	At full load
Minimum Load	No minimum load required				
Line Regulation			±0.2	%	From minimum to maximum input at full load
Load Regulation			±0.5	%	From 0% to full load
Transient Response			±4	%	Maximum deviation, recovering to less than 1% in 500µs for 25% step load change
Ripple & Noise			100	mV pk-pk	See Models & Ratings, measured using external 10µF MLCC
Overload Protection		150		%	
Short Circuit Protection	Continuous hiccup mode, with autorecovery				
Maximum Capacitive Load	See Models & Ratings table				
Temperature Coefficient			0.02	%/°C	
Overvoltage Protection		120		%	Zener diode clamp
Remote On/Off	ON at 3.0 VDC to 12.0 VDC or open circuit (Positive logic reference to -Vin (pin 2) OFF at 0 VDC to 1.2 VDC or short pin 2 to pin 3				

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		85		%	See Models & Ratings table
Isolation: Input to Output	3000			VDC	60s basic isolation
Isolation Resistance	10^8			Ω	At 3kVDC
Isolation Capacitance		2000		pF	
Switching Frequency		250		kHz	
Power Density			28	Win^3	
Mean Time Between Failure	230			khrs	MIL-HDBK-217F, +25°C GB
Weight		36.0 (0.079)		g (lb)	Standard
		47.0 (0.104)			With heatsink
Case Material	Copper case with non-conductive plastic base, UL94V-0 rated				
Potting Material	Epoxy UL94V-0				
Pin Material	Tinned copper Ø1.0 mm brass, solder coated				
Fire and Smoke	Meets EN45545-2				
Lead Free Reflow Solder Process	IPC JEDEC J-STD 020D.1. 260°C max. 1.5mm from case. 10s max.				

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Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+100	°C	See derating curve
Storage Temperature	-55		+125	°C	
Thermal Impedance to Air	9.5			°C/W	Without heatsink
	8.5				With heatsink
Humidity			95	%RH	Non-condensing
Altitude	5000 m operation				
Cooling	IEC/EN 60068-2-1				
Shock & Vibration	IEC/EN 61373				
Dry Heat	IEC/EN 60068-2-2				
Damp Heat	IEC/EN 60068-2-30				

EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
Railway Equipment	EN50121-3-2		Conducted and Radiated

EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Railway Equipment	EN50121-3-2			Electromagnetic compatibility for rolling stock apparatus
ESD Immunity	EN50121-3-2	±6kV/±8kV	A	Contact Discharge/Air Discharge
Radiated Immunity	EN50121-3-2	20V/m	A	
EFT/Burst	EN50121-3-2	±2kV	A	With external capacitor Suggested parts are 100µF/250V electrolytic capacitors two in parallel e.g. Ruby-con BXF series
Surge	EN50121-3-2	±2kV	A	
Conducted immunity	EN50121-3-2	10Vrms	A	See application notes
Magnetic Fields	EN61000-4-8	100A/m	A	

Safety Approvals

Safety Agency	Standard	Test Level	Notes & Conditions
EN	50155		Railway
CE	Meets all applicable directives		
UKCA	Meets all applicable legislation		

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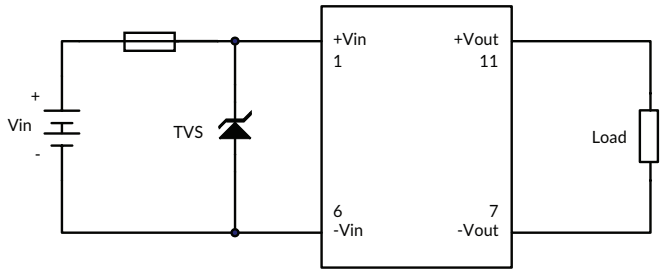
Application Notes

Input Fusing and Safety Considerations

The RDF25 series converters have no internal fuse. In order to achieve maximum safety and system protection, always use an input line fuse. We recommended a 3A time delay fuse. It is recommended that the circuit has a transient voltage suppressor diode (TVS) across the input terminals to protect the unit against surge or spike voltages and input reverse voltage (as shown).



Output Voltage Adjustment

The trim input permits the user to adjust the output voltage up by 10% or down by 10%. This is accomplished by connecting an external resistor between the Trim pin and either the +Vout pin or the -Vout pin.

To Trim Down

Connecting an external resistor (Rd) between the Trim pin and the +Vout pin decreases the output voltage. The following table can be used to determine the required external resistor value to obtain a percentage output voltage change of Δ%.

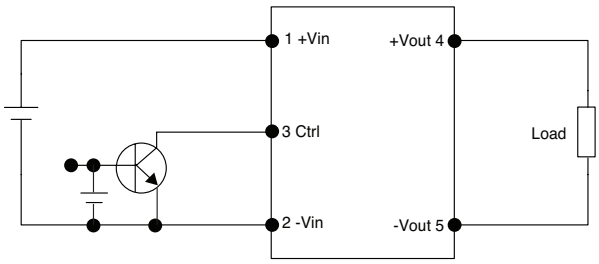
To Trim Up

Connecting an external resistor (Ru) between the Trim pin and the -Sense pin increases the output voltage. The following table can be used to determine the required external resistor value to obtain a percentage output voltage change of Δ%.

Trim Down %	5V	12V	15V	24V
	Rd (kΩ)			
1	248.700	323.351	174.366	881.316
2	110.625	138.100	91.104	466.830
3	66.263	79.928	56.589	293.177
4	44.381	51.470	37.706	197.709
5	31.346	34.591	25.796	137.326
6	22.695	23.418	17.598	95.690
7	16.534	15.477	11.611	65.243
8	11.924	9.542	7.047	42.009
9	8.345	4.939	3.453	23.696
10	5.485	1.264	0.548	8.891

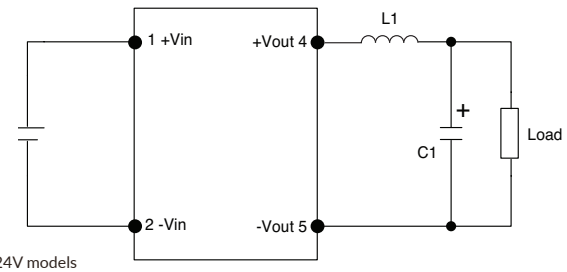
Trim Up %	5V	12V	15V	24V
	Ru (kΩ)			
1	227.338	367.425	661.510	2846.648
2	109.310	179.645	231.250	955.230
3	68.596	113.623	134.015	542.693
4	47.972	79.929	91.042	362.055
5	35.510	59.489	66.818	260.681
6	27.166	45.767	51.270	195.786
7	21.187	35.919	40.445	150.682
8	16.694	28.508	32.475	117.514
9	13.193	22.728	26.362	92.097
10	10.389	18.094	21.524	71.999

Remote On/Off Control



Positive logic. Module turns on with logic high. Logic low turns module off. On/Off is enabled by an external switch between the control pin 3 and -Vin pin 2, e.g. open collector or drain. If the Remote On/Off is not used leave pin 3 floating.

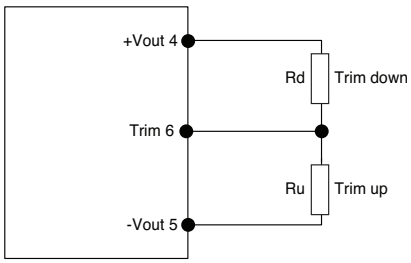
EMC



Not applicable for 24V models

C1 Electrolytic	L1
22µF, 100V	4.7µH

Output Voltage Trim



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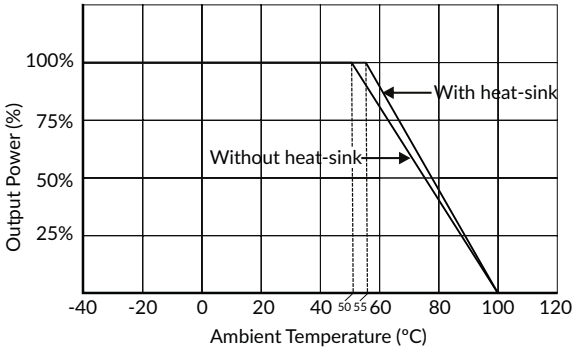
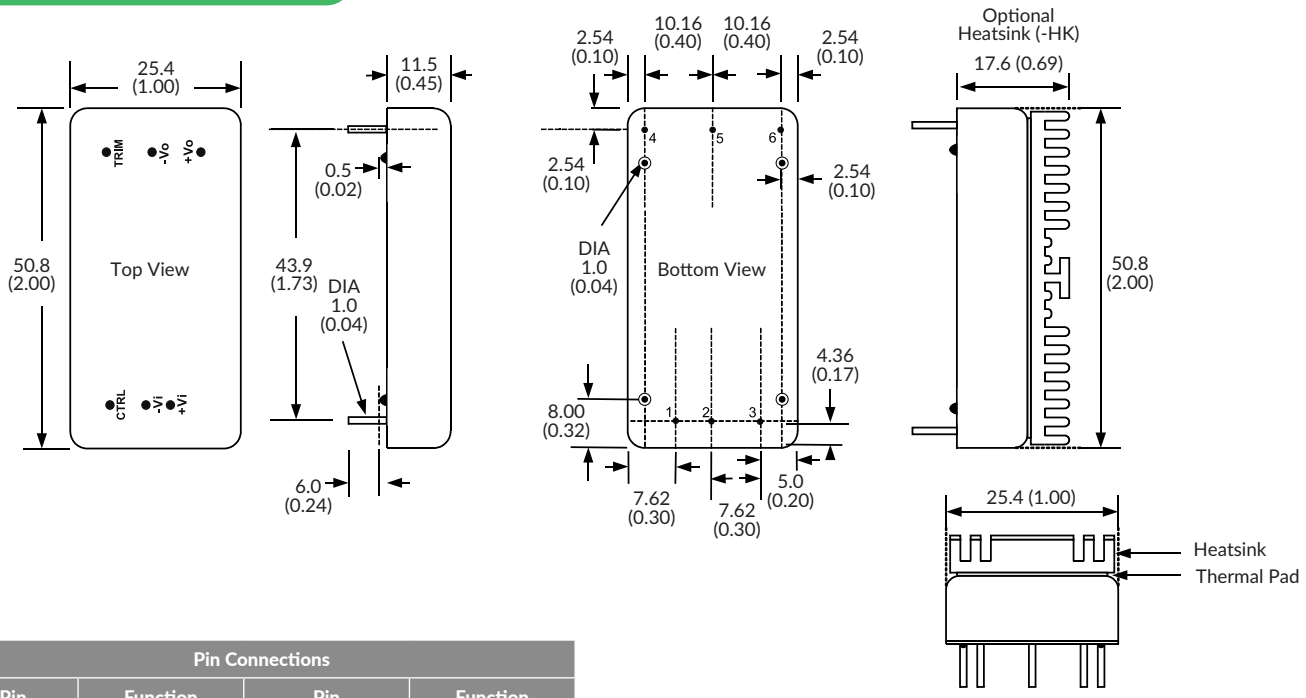
Application Notes

Derating Curve



Mechanical Details



Pin Connections			
Pin	Function	Pin	Function
1	+Vin	4	+Vout
2	-Vin	5	-Vout
3	Control	6	Trim

Notes:

1. All dimensions are in mm (inches)

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